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ABSTRACT

A parity-equity model for estimating the influences of rational and nonrational inequity and parity (marketplace) factors on faculty salaries were developed. A comprehensive list of factors was classified as rational equity (e.g., professorial rank, years in rank, years of experience), nonrational equity (e.g., sex, years at university), and marketplace (average salaries of faculty by rank, by college, and by department at eight other land-grant AAU institutions). In a multiple regression analysis, 61 percent of the variation in salaries of 922 faculty was explained by professorial rank; 16 percent by other rational equity factors; 2 percent by college parity; 1 percent by college affiliation; and 1 percent by nonrational equity factors. Neither college affiliation nor college or department parity was as important as the internal equity factors, with the rational equity factors as the most important. In total, 81 percent of the variance in salaries was accounted for by the parity-equity model. The issues in using this model to evaluate salary policies are discussed. The use of the model is recommended for studying the year-to-year changes in salaries policies but its use to determine possible discrimination in salary for an individual faculty member is problematic. (Author/LBH)

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THE USE OF A PARITY - EQUITY MODEL TO EVALUATE FACULTY SALARY POLICIES

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ABSTRACT

The Use of a Parity-Equity Model to Evaluate

Faculty Salary Policies

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A parity-equity model for estimating the influences of rational and non-rational inequity and parity (marketplace) factors on faculty salaries was developed. A comprehensive list of factors was classified as rational equity (e.g., professorial rank, years in rank, years of experience), non-rational equity (e.g., sex, years at university), and marketplace (average salaries of faculty by rank, by college, and by department at eight other land grant AAU institutions). In a multiple regression analysis, 61% of the variation in salaries of 922 faculty was explained by professorial rank; 16% by other rational equity factors; 2% by college parity; 1% by college affiliation; and 1% by non-rational equity factors. Neither college affiliation nor college or department parity was as important as the internal equity factors, with the rational equity factors as the most important. In total, 81% of the variance in salaries was accounted for by the parity-equity model. The issues in using this model to evaluate salary policies are discussed. The use of this model is recommended for studying the year to year changes in salary policies but its use to determine possible discrimination in salary for an individual faculty member is problematic.

The Use of a Parity - Equity Model to Evaluate Faculty Salary Policies

Faculty salaries have become an increasingly important topic during the past few years. The reasons involve economic, moral, and legal issues. The diminishing mobility of faculty and the rapidly rising cost of living have caused faculty to turn their attention to the salary policies and practices at their own institution. The legal impetus for eliminating sex discrimination began with the Equal Pay Act of 1963, but the more recent laws and orders (e.g., Executive Orders 11246 and 11375; Article IX of the Education Amendments Act of 1972) have made antidiscrimination more than administrative talk. Finally, the awareness and need to treat all staff equally is accepted by almost everyone in higher education today so that the issue of an equitable salary plan is no longer a dilemma. The procedures of determining the fairness of the salary policies and practices has become the focus.

Many university administrators and faculty have used the internal labor market analysis in their study of faculty salaries. (Bergmann and Maxfield, 1975; Katz, 1973; Nevill, 1975; Reagan and Maynard, 1974). Each institution awards salary increments to its faculty in accordance with the importance it places on a set of factors measuring the contribution of a faculty member to the institution. Usually, the set includes factors of scholarly productivity, years of professional experience, academic rank, and departmental differences in salaries paid to faculty. The more recent studies conducted at local institutions have included sex as an additional factor so that possible discrimination against females could be studied. The results of most studies (Bergmann and Maxfield, 1975; Ferber, Loeb, and

Lowry, 1976; Gordon, Morton, Braden, 1976; Katz, 1973; Nevill, 1975; Reagan and Maynard, 1974) have shown that women receive lower salaries than comparable men, a finding that is collaborated by national surveys (Bayer and Astin, 1975; Johnson and Stafford, 1974; Tuckman and Tuckman, 1976). A predominantly internal market analysis may be too restrictive a model to account for all the influences of salary differences. Although salary increases within a given university or college are primarily the result of internal promotion and salary policies aimed to reward professional and academic productivity at the institution, outside influences do effect salaries differently in various departments.

A combination of internal policy decisions and market influences have been used as reasons for salary differences between men and women. Reagan and Maynard (1974) state that one important reason is the "peculiar relationship of many women to the external labor market." Johnson and Stafford (1974) argue that economic factors of "human capitol" must be considered in interpreting the difference between men and women faculty salaries. Based on the salaries of faculty in six disciplines, they conclude that "over one-half of the academic salary differential by sex can be explained by the market's reaction to voluntary choices by females regarding on-the-job training." (p. 902) Others do not agree with this life cycle human capitol explanation because there is no solid evidence that female faculty initially select less prestigious institutions and do not seek as many opportunities to develop their human capital as men do. (Strober and Quester, 1976)

The study of the market influences at one institution can provide some insights into the importance of the external relative to the internal market factors. The analysis can show the extent to which factors internal and external to an institution are associated with salary differentials of the

faculty. The purpose of this study was to develop a comprehensive list of factors influencing salary differences among the faculty at a land grant university. This list of factors classified as internal rational equity factors, internal non-rational equity factors, and marketplace factors was included in a multiple regression analysis to answer the question: Do faculty receive different salaries as a result of marketplace influence, administrative decisions that reflect the University policy on awarding faculty for their performances or for some reasons which cannot be defended as rational or fair? More specifically, how has the university weighted each of these factors in determining the salaries of faculty?

METHOD

A parity-equity model for describing faculty salaries was developed to describe the relative importance of several factors on salaries. Four different classes of factors were identified and incorporated into the parity-equity model:

(1) Rational equity factors: Differences in experience, merit, and administrative responsibility should be associated with salary differences. Included in this class were: (a) professorial rank, (b) professional degree, (c) graduate faculty membership status, (d) tenure status, (e) years in current professorial rank, (f) administrative responsibilities (chairperson), and (g) years of professional experience.

(2) Non-rational equity factors: Certain factors relating to faculty salaries were not considered rational or equitable, but may still result in faculty salary differences: (a) sex, (b) age, (c) years at the university, (d) 9-month versus 12-month appointment, and (e) former administrative experience (former chairperson, dean, etc.).

(3) Parity or marketplace factors: A college or department may pay higher or lower salaries than others because of the nature of the academic marketplace. Average faculty salaries by college and by department in eight other land grant Association of American Universities (AAU) institutions were used as an indicator of marketplace influence.

(4) Other factors: Other factors which influence salaries could not be measured in this study. They include merit factors which are not reflected in the measured rational equity factors discussed above; e.g., scholarly achievements, research publications, professional peer recognition. Other sources of inequity related to personal biases of administrators toward faculty were also not measured.

Subjects:

All faculty in the colleges of Agriculture, Architecture, Arts and Sciences, Business Administration, Engineering and Technology, and Home Economics, and teachers with a rank of Assistant Professor and above and employed by the university at least half time were included in the study. Faculty holding administrative positions other than departmental chairpersons were excluded. Table 1 presents the number of the 922 faculty with full, associate or assistant professorial rank in each college.

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Insert Table 1 about here

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Procedures:

Data for all the internal equity factors were obtained from personnel records stored in the Office of Institutional Research. The departmental and college parity salaries were calculated from information received from

the eight universities participating in the annual AAU institutional data exchange. Departments at the other universities were equated with the University of Nebraska-Lincoln department by matching HEGIS departmental codes. The other universities were the Universities of Illinois, Iowa State, Minnesota, Missouri, Ohio State, Pennsylvania State, Purdue, and Wisconsin.

Results:

Several multiple regression analyses of various combinations of the classes of the factors were run to determine the relative importance of each factor and of each class. If any factor listed in the equity classes were categorical and not continuous, dummy variables were established for each category of the factor.

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Insert Table 2 about here

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Table 2 presents the findings from a regression analysis to determine the relative importance of each factor when only the internal equity factors are included in the regression analysis. Table 2 presents the unstandardized regression weights and standard errors of each coefficient (weight) of each dummy variable and factor included in the regression analysis. The weight of each dummy variable represents the dollar increment associated with the variable category of the factor relative to the excluded category when all other factors are statistically controlled. (The dummy variable for each excluded category is listed in the note at the bottom of the table.) The weights of the factors, years in rank, and age represent salary increments associated with differences between the values of the factors when all other factors are controlled.

The importance of the rational and non-rational equity factors on salary differences varies considerably. Of the rational factors, Rank, Years in Rank, Highest Degree, and Chairperson of Department are significant when the ratio of the regression weight and its standard error is used to indicate statistical significance at $p < .05$. The other rational factors, Graduate Faculty Status (an indicator of research and scholarly achievement), Tenure Status, Years of Professional Experience do not contribute significantly to salary differences. Two of the five non-rational equity factors included in the analysis are statistically significant. They are Former Department Chairperson and Years Since Hired by the University. Faculty with previous department chairperson status receive on the average $1,456 more than otherwise comparable faculty. Faculty more recently hired by the university earn higher salaries than faculty serving the institution for longer periods of time. The longer faculty members stay, the less competitive they become, and faculty salary ceilings begin to show their effect. College affiliation, not classified in this analysis as either rational or non-rational, is also important, with faculty in the College of Business Administration receiving $1,970 more than comparable faculty in the College of Liberal Arts. The set of factors is highly related to salaries, since they account for 81% of the variability in faculty salaries.

A second regression analysis is presented to determine the relative influence of the equity and marketplace classes. In this analysis, the factors are entered into the regression equation in a predetermined order, so that the added contribution of additional factors could be assessed. Table 3 presents the percent of variance in faculty salaries associated with each class of factors--rational equity factors, non-rational equity factors, and marketplace factors--and the order they were entered into the multiple

regression equation. The variance explained as each factor class is added and explained variance are presented.

Column 1 presents the contribution of each set of factors to explained variance of salaries. Since many of the factors in the various sets are correlated with each other, these add up to well over 100 percent of the variance in salaries. The rational equity factors clearly are the most powerful determinants of salary differences at this institution with professorial rank as the single most important factor. While the rational equity factors account for 77 percent of the total variance in salaries, professorial rank alone accounts for over 60 percent.

Parity or marketplace influences, as measured by the average salaries of faculty by rank by college at the eight other land-grant institutions, accounts for over 38 percent of the variance in salaries. However, since this measure was contaminated by rank, an analysis was run using only AAU College averages to determine the contribution of marketplace. The overall average salary by college, standardized by rank distribution, explains only three percent of the variation in salaries. This percent is small, but only 3.9 percent of the variation in salaries is explained by college affiliation at the institution. Finally, the non-rational equity factors by themselves make a major contribution; but since many of these (e.g., age and sex) are strongly correlated with other rational factors, this figure means little by itself.

Column 2 indicates the order in which the classes of factors are entered into the regression equation. With all classes of factors included, the rational equity factors account for 77 percent of the variance in salaries. The variance explained by the factors other than the rational equity factors is only 4.2 percent. The college by rank marketplace contributes 2.3 percent

to this total, making it the single most important contributor of the remaining measured factors. Nevertheless, the internal factors are clearly the most significant. While direct measures of merit are lacking, only 18.8 percent of the variation in salaries remains unexplained.

A third regression including a measure of departmental parity was run to estimate marketplace influences at the departmental level. The number of faculty analyzed was reduced to 773 as direct departmental parity figures for all departments were not obtainable. While 18.5 percent of the variability in salaries is attributed to departmental affiliation at the university, departmental marketplace standardized for rank accounts for 9.8 percent by itself. When added to the regression equation after the other parity and rational equity factors, however, departmental parity accounts for only 0.49 percent of the variation in salaries. Neither college nor department parity, therefore, is as important as the internal equity factors.

Discussion:

The parity-equity model used provides a reasonably complete portrayal of salary differences among the faculty. Eighty-one percent of the variability among faculty salaries is accounted for by the two internal equity factors even though no direct indices of research productivity or performance in teaching and service are included as factors. This result compares favorably with other studies at local institutions in which direct measures of research and productivity were included in the analyses, e.g., Braskamp, Muffo, and Langston (1977); Gordon, et al (1976); Katz (1973); Reagan and Maynard (1974).

Of the internal equity factors, academic rank has the greatest association with salary, but such factors as former departmental chairperson status

and years since hired at the university are also important factors to salary differentials when all other factors are statistically controlled. The significance of being a former department chairperson may reflect the importance of specific human capitol factors. These faculty who historically have played an active role in the decision making process in the university may also become the beneficiary of the salary policies or practices. Or, the appointment to such a position may be a good indicator of professional productivity and competence.

In comparing the relative importance of each class of factors, the importance of the non-rational internal equity factor is small compared to the rational equity factors and the marketplace factors. That sex is not a statistically significant factor is an exception to the general finding that female faculty are paid less than comparable male faculty. One reason for this finding could be that college affiliation, which is confounded with density of female faculty, is included as a factor; and differences among colleges could help account for the salary differences between men and women.

The association between marketplace and salaries indicates that departmental salaries at this university reflect external marketplace demands, but the relationship is not high when compared to the importance of internal labor market factors (Reagan and Maynard, 1974). Koch and Chizmar (1976) used an index of marketplace not directly tied to the local university salary structure, and found that marketplace demands for each discipline classified as strong, moderate, or weak were significantly related to faculty salaries at Illinois State University. If marketplace is used as a factor in studying salaries, a measure of marketplace independent of the local salary structure seems preferable to one tied to the entry salary level of the institution such as average assistant professor salary by department.

When the internal and marketplace factors are all included in the analysis, 81% of the variability of salaries is accounted for. However, the standard error of estimate of the predicted salary of any one faculty member is still $1,767 since the standard deviation of salaries is $4,054. Some universities have used the factual-counterfactual methodology in which a regression equation is calculated on a group (e.g., males), and then used to predict the salaries of another group (e.g., females) treating them as members of the group on which the equation was calculated. This model has been used for affirmative action purposes but the problems encountered in predicting a salary for a single faculty member to determine possible discrimination should not be underestimated (Braskamp, Muffo, and Langston, 1977).

A preferable use of the regression model is to run the regression analyses on faculty salaries for a series of years to examine the trends and the impact of a specific university policy or plan. For example, Koch and Chizmar (1976) investigated over a five year period the effect of the affirmative action plan to eliminate discrimination against females. By applying the same methodology over the years they were able to determine if salary distributions over this period eradicated any sex discrimination in salaries. At the institution in this study, the data analyses on salaries for the subsequent year show that the importance of college affiliation was reduced, especially for faculty with assistant and associate professor rank. A salary policy stressing greater departmental parity but less college affiliation influences on salary was adopted partly in response to faculty in some colleges and to external interest groups.

Any analytical model for evaluating faculty salaries must be used judiciously. The results of the model are empirical; i.e., the association of each factor to faculty salaries is empirically determined. The relation-

ship or influence of each factor in the model may not be one which the university desires or considers to be most fair and consistent with future plans. This approach can help the university community understand the factors which were used to reward salary increases in the past. If the model is to be used to justify salary increases in the future, then the administration and faculty are tacitly promulgating their previous decisions. The decision to weigh the various factors in determining faculty salaries is a policy decision. This model can serve as a check on the consistency with which decisions are made, but it should not be used automatically to determine the future importance of each factor. Justification of differences in salaries is still the responsibility of the various publics which are interpreted and negotiated by the university administrators and faculty.

Table 1

Number of Faculty by College by Rank

College	Rank		
	Professor	Associate	Assistant
Agriculture	115	70	62
Architecture	6	7	4
Arts and Sciences	167	139	85
Business Administration	24	18	10
Engineering	46	31	20
Home Economics	9	18	17
Teachers	27	37	35

Table 2

Regression Weights and Standard Errors of the Equity Factors in the Regression Analysis

Factor	Regression Weight	Standard Error
Rank		
Associate Professor	2,794	299
Full Professor	6,018	345
Years in Rank (Dollars added for each year)		
Assistant Professor	340	57
Associate Professor	239	33
Full Professor	271	18
Highest Degree		
Bachelors	-1,832	421
Masters	-1,124	151
Graduate Faculty Fellow	114	147
Chairperson of Department	2,751	219
Professional Experience (Dollars for each year)	24	14
Tenured	-336	232
Former Department Chairperson	1,456	272
Former Administrator	873	659
Age (Dollars for each year beyond 30)	2	12
Sex (female)	-173	210
Appointment (12 month)	-49	293
College Affiliation		
Agriculture	-202	311
Architecture	611	425
Business Administration	1,970	238
Engineering and Technology	437	191
Home Economics	461	343
Teachers	370	200
Years Since Hired by University		
6 to 10 years	-871	173
11 to 20 years	-1,494	213
21 to 30 years	-1,942	276
31 or more years	-3,395	586

Note: All salaries are calculated on an academic year basis. The excluded dummy factors correspond to an untenured, 30-year-old male assistant professor in the College of Arts and Sciences with a Ph.D. who has been in rank one year or less, has had no previous experience before coming to the university, and was hired less than 5 years ago, and is also not a member of the Graduate Faculty. Total number of faculty analyzed was 911.

Table 3

Percent of Variance of Salaries

Accounted for by Each Class of Factors

Factor Class	(1) Percent Variance Accounted By Set Alone	(2) Order Entered Into Regression	(3) Percent Variance Accounted	(4) Cum. Variance Accounted
Rational Equity	77.0			
Professional rank	60.7	1	60.7	60.7
Other rational	45.3	2	16.3	77.0
Parity or Marketplace				
AAU College by rank	38.1	3	2.3	79.3
UNL College Affiliation	3.9	4	0.5	79.8
Non-rational Equity	32.0	5	1.4	81.2
Other Factors Not in Analysis			18.8	100.0

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